Idaho State Department of Agriculture
Division of Agricultural Resources

Monroe Creek
Water Quality Monitoring Report
April 2003 through October 2003

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ISDA Technical Report Summary W-11

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Introduction

The Idaho State Department of Agriculture (ISDA) recently completed a water quality monitoring project on Monroe Creek. The monitoring was conducted by ISDA at the request of the Weiser River Watershed Advisory Group (WAG). Monroe Creek is located within the Hydrological Unit Code (HUC) 17050124 and is not listed on the State of Idaho 303(d) list for Total Maximum Daily Load (TMDL) development. The Weiser WAG had concerns that Monroe Creek, which confluences with the Weiser River, may eventually be 303(d) listed or may be contributing unwanted loads of sediment and nutrients into the Weiser River. The Weiser River is undergoing TMDL development for a variety of pollutants.

There were two stations located on Monroe Creek with an up gradient station (MC-2) being established approximately two miles upstream of Sheep Creek. MC-2 was established higher in the watershed to characterize the rangeland and pasture activities in the upper watershed. It was also established to help define potential background conditions on Monroe Creek.

MC-1 was located approximately 8 miles downstream of MC-2 just north of the town of Weiser where Monroe Creek crosses under Highway 95 (Figure 1). MC-1 receives inputs of water from Sheep Creek and various irrigation return drains. Below MC-1, Monroe Creek receives lawn irrigation return water and other runoff as it travels through the city of Weiser. A monitoring site could not be established directly below the city.

Monitoring was conducted during the critical period (April thorough September) of the year as defined by the Idaho Department of Environmental Quality (IDEQ) for the Snake River Hells Canyon TMDL.

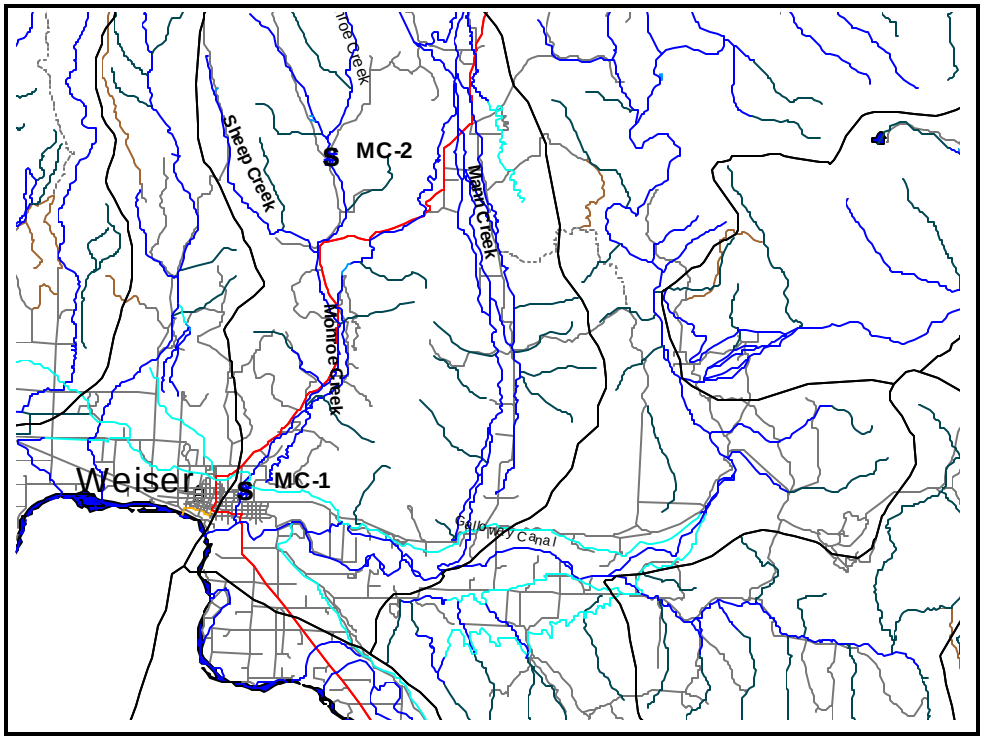

Figure 1. Monroe Creek Monitoring Sites (MC-1 and MC-2).

ISDA monitored twice a month from April through October of 2003 for total suspended solids (TSS), total volatile solids (TVS), total phosphorus (TP), ortho-phosphorus (OP), and Escherichia Coli (*E-coli*). On-site measurements for dissolved oxygen, temperature, % saturation, conductivity, total dissolved solids, pH, and discharge (Appendix A) were collected during each monitoring trip.

General Results

Total Suspended Solids (TSS)

TSS concentrations within Monroe Creek remained low during the 2003 sampling period. These low concentrations may be normal or may represent the conditions found during a drought period. The highest individual concentration of TSS was 29 mg/L on July 17, 2003 at MC-2 and 34 mg/L for MC-1 on September 10, 2003 (Figure 2). The TSS mean concentration was 14.4 mg/L for MC-2 and 11.2 mg/L for MC-1.

Although the mean concentrations at both stations are similar the TSS load at MC-1 is approximately 3.5 times the load recorded at station MC-2. The driving factor for the increased load at MC-1 is the discharge rate (Figure 3). The mean discharge rate at MC-1 (14.5 cfs) is almost five times the rate recorded at MC-2 (3.13 cfs).

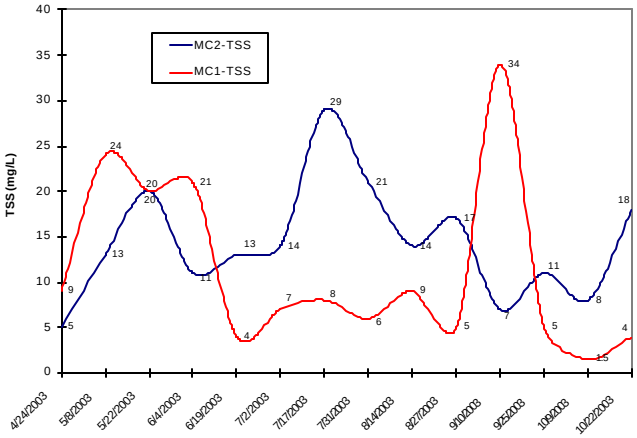

Figure 2. TSS concentrations MC-1 and MC-2

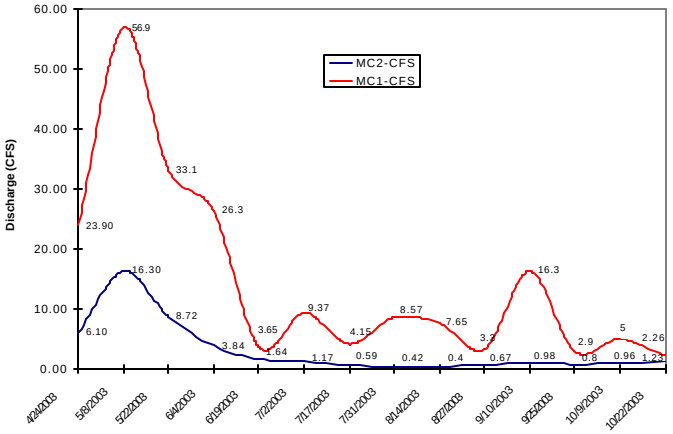

Figure 3. Discharge rates for MC-1 and MC-2

Total Phosphorus (TP)

Monroe Creek discharges directly into the lower portion of the Weiser River. According to the Snake River Hells Canyon Complex (SR-HC) TMDL the Weiser River would need to reduce its TP load to the Snake River by approximately 62%. The TP target within the Snake River is 0.07 mg/L. This is a total phosphorus target which includes both particulate phosphorus and ortho-phosphorus.

As with many creeks within the Weiser area the dominant form of phosphorus is ortho-phosphorus which is in the dissolved form. At MC-2 and MC-1 ortho-phosphorus makes up 90% and 82% of the TP respectively (Figure 4 and 5).

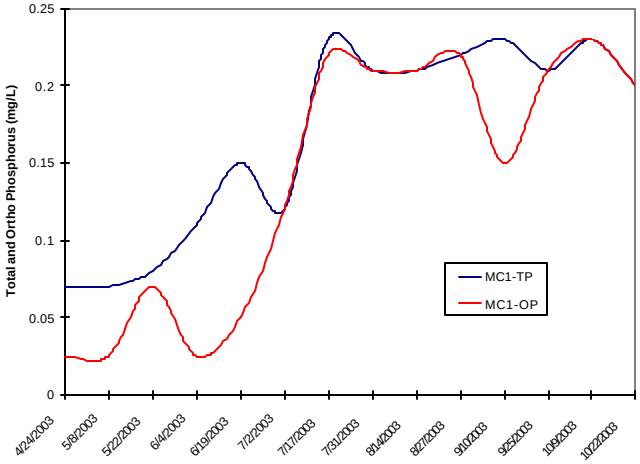

Figure 4. MC-1 total and ortho-phosphorus concentrations

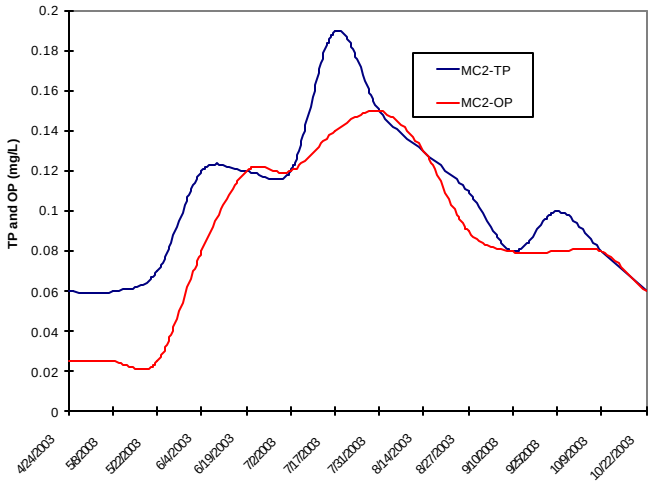

Figure 5. MC-2 total and ortho-phosphorus concentrations

The mean concentration for TP was 0.10 and 0.17 mg/L for MC-2 and MC-1 respectively. If Monroe Creek was required to achieve the 0.07 mg/L TP level assigned for the Snake River a reduction of 59% TP would be required. In the upper portion of the watershed a reduction of 30% TP would be required to meet the 0.07 mg/L goal at station MC-2. If the 30% reduction was achieved in the upper watershed (above MC-2), the percent reduction at MC-1 would be reduced to 41%. The TP statistics for both sites are presented in Table 1.

Table 1. Monroe Creek TP (mg/L) statistics

Site	n	Min.	Max.	Mean	Std. Dev.
MC-1	14	0.07	0.23	0.17	0.06
MC-2	14	0.06	0.19	0.10	0.04

The SR-HC TMDL sets the overall Weiser River reduction for TP at 62%. This number would be slightly higher than the 59% reduction required on Monroe Creek to meet the 0.07 mg/L TP goal. The 62% reduction would lower the concentration at MC-1 to 0.064 mg/L which is lower than the 0.07 mg/L TP goal for the Snake River.

Temperature

Monroe Creek is not listed on the state's 303(d) list but the beneficial use designation would still require the support of cold water biota. Cold water biota requires a water temperature of 22°C or less; with a minimum daily average of 19°C. Only instantaneous temperature measurements were taken during this program (Figure 6). The highest recorded temperature occurred on July 31, 2003 at MC-2 (20.6°C) and MC-1 (20.8°C).

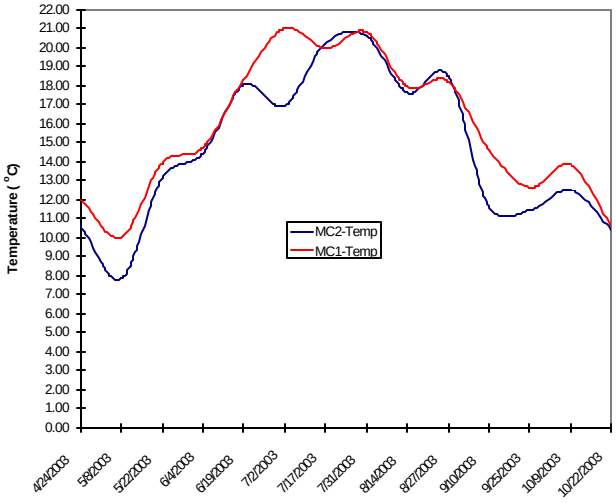

Figure 6. Monroe Creek instantaneous temperature

Dissolved Oxygen

Waters designated for cold water biota are to exhibit dissolved oxygen concentrations exceeding 6 mg/L at all times. The instantaneous measurements for dissolved oxygen exceeded this criteria (Figure 7).

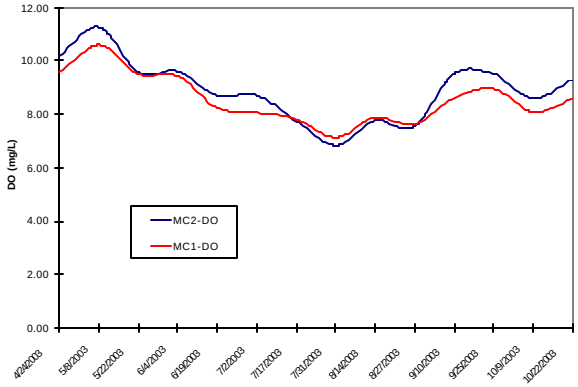

Figure 7. Monroe Creek instantaneous dissolved oxygen.

Bacteria (*E-coli*)

The listed pollutants for the Weiser River include bacteria and one of the Weiser River's designated uses is primary contact. Monroe Creek was tested for *E-coli* to determine if it may be a source of bacteria input into the Weiser River. Table 2 indicates that the upstream site (MC-2) exceeded the one time primary contact *E-coli* criteria, 406 colony forming units (CFUs), 70% of the time. The downstream site (MC-1) had 2 exceedances during the same time period.

During the summer months MC-2 becomes very shallow and the flow rate dropped to around 1 cfs. This low flow condition with warmer water temperatures results in prime conditions for bacteria growth. MC-1 has a higher discharge rate throughout the summer with more dilution water and less near stagnant conditions.

Table 2. Monroe Creek E-coli results.

Collection Date	MC-2 *E-coli* (CFUs)	MC-1 *E-coli* (CFUs)
4-24-03	60	380
5-8-03	260	210
5-22-03	110	240
6-4-03	>2500	140
6-19-03	1100	160
7-2-03	520	290
7-17-03	>2500	>2500
7-31-03	>2500	20
8-14-03	2400	350
8-27-03	1100	180
9-10-03	2100	150
9-25-03	1400	130
10-9-03	380	620
10-22-03	480	70

Conclusions

Data collected during this study coincided with the continued drought conditions that are currently impacting Idaho. This data may not represent conditions during a more normal precipitation year.

The mean concentration of TSS within the water column for Monroe Creek was quite low throughout the monitoring period. The mean concentration level for MC-1 (1.2 mg/L) and MC-2 (14.4 mg/L) were below any threshold concentrations established for other bodies of water in Idaho. During the summer months the substrate at station MC-2 is completely covered with a very fine easily suspended silt. At MC-1, the substrate is composed of small boulders (256-512 mm) to small cobbles (64-128 mm) that are completely covered with periphyton.

If the Weiser River TMDL will require a 62% reduction in TP, then reductions of TP for Monroe Creek will need to be addressed. The average TP concentration at MC-1 of 0.17 mg/L would dictate a reduction of 59% to achieve a target of 0.07 mg/L within Monroe Creek. Depending on the mass balance from contributions of other TP sources, into the Weiser River, the TP percent reduction for Monroe Creek may be lower.

The collected data indicates that between 82-90% of the TP within Monroe Creek exists in the most bioavailable form (dissolved). Best management practices (BMPs) that are established to reduce sediment losses often have little effect on the concentrations of dissolved phosphorus. Although there are inevitable losses of bioavailable phosphorus from agricultural soils, losses can be minimized by some of the following practices:

- Do not build or maintain excessive phosphorus within the soil profile.
- Do not apply more phosphorus than the amounts needed for crop production.
- Incorporate phosphorus additions.
- Use soil conservation techniques to keep erosion to a minimum.
- Avoid application of fertilizers on frozen or snow covered grounds to minimize runoff.
- Practice proper water management.
- Develop a nutrient management plan (NMP).

If the Weiser River is found to have bacteria levels that violate the primary contact water quality rule, then Monroe Creek may require further evaluation. Data indicated that site MC-2, which is the upstream site, exceeded the one time level for E-coli (406 CFUs) 70% of the time. MC-1, which is the lower site, exceeded the 406 CFU threshold only 14% of the time. The location of MC-1 does not account for any additional bacteria sources that may be present as Monroe Creek flows through the city of Weiser. Additional testing for E-coli at MC-1 may be necessary to determine if Monroe Creek violates the state standard for bacteria levels for primary contact.

Appendix A

Monroe Creek Near Mouth Upstream of town
MC-1

Date	DO	Temp	%Sat	Cond.	TDS	pH	Discharge	TSS	TVS	TP	OP	E-coli
4/24/2003	9.55	12.00	88.80	170	85	7.87	23.90	9	5	0.07	<0.05	380
5/8/2003	10.59	10	93.90	140	71	8.09	56.9	24	4	0.07	<0.05	210
5/22/2003	9.5	13.9	92.10	196	98	7.69	33.1	20	<3	0.08	0.07	240
6/4/2003	9.42	14.7	92.8	159	81	7.87	26.3	21	4	0.11	<0.05	140
6/19/2003	8.23	18.3	87.8	342	174	7.73	3.65	4	3	0.15	0.05	160
7/2/2003	8.06	21	90.2	209	104	7.75	9.37	7	<3	0.12	0.12	290
7/17/2003	7.81	19.9	85.6	425	218	na	4.15	8	<3	0.23	0.22	>2500
7/31/2003	7.13	20.8	79.8	357	185	na	8.57	6	<3	0.21	0.21	20
8/14/2003	7.88	17.9	79.4	403	205	na	7.65	9	<3	0.21	0.21	350
8/27/2003	7.62	18.2	85.8	463	235	na	3.3	5	4	0.22	0.22	180
9/10/2003	8.6	14.6	84.6	237	119	na	16.3	34	8	0.23	0.15	150
9/25/2003	8.95	12.6	84.1	496	254	8.1	2.9	5	<3	0.21	0.21	130
10/9/2003	8.07	13.8	78	547	274	8.05	5	<3	<3	0.23	0.23	620
10/22/2003	8.57	10.6	77	536	272	8.2	2.26	4	<3	0.2	0.2	70

Monroe Creek Headwaters
MC-2

Date	DO	Temp	%sat	Cond.	TDS	pH	discharge	TSS	TVS	TP	OP	E-coli
4/24/2003	10.20	10.60	91.70	215.00	110.00	8.23	6.10	5	<3	0.06	<0.05	60
5/8/2003	11.25	7.8	94.5	171	86	8.38	16.30	13	4	0.06	<0.05	260
5/22/2003	9.56	13.1	90.7	180	90	7.91	8.72	20	4	0.07	<0.05	110
6/4/2003	9.6	14.4	93.2	210	109	8.22	3.84	11	<3	0.12	0.08	>2500
6/19/2003	8.69	18	91.4	204	104	8.04	1.64	13	4	0.12	0.12	1100
7/2/2003	8.71	16.9	90.1	206	104	8.17	1.17	14	4	0.12	0.12	520
7/17/2003	7.73	20.2	85.3	205	110	na	0.59	29	<3	0.19	0.14	>2500
7/31/2003	6.83	20.6	76.2	200	103	na	0.42	21	3	0.15	0.15	>2500
8/14/2003	7.74	17.6	79.4	197	100	na	0.4	14	<3	0.13	0.13	2400
8/27/2003	7.54	18.5	80.5	193	97	na	0.67	17	6	0.11	0.09	1100
9/10/2003	9.51	11.6	87.5	193	97	na	0.98	7	3	0.08	0.08	2100
9/25/2003	9.5	11.4	87.1	196.7	96	8.17	0.8	11	<3	0.1	0.08	1400
10/9/2003	8.58	12.5	80.3	193	97	8.05	0.96	8	<3	0.08	0.08	380
10/22/2003	9.3	10.4	83.1	157	79	8.22	1.23	18	<3	0.06	0.06	480